# Crew Health And Recreation Gear Exercise Device

Completed Technology Project (2012 - 2012)

## Project Introduction

This technology is to replace the bulky, high maintenance exercise devices (as used currently in the ISS) for long duration missions. A novel exercise and recreation device is proposed that can provide physical and mental health preservation benefits during long duration deep space exploration missions. A prototype based on MR dampers was built to demonstrate the technology. However, this will need to be modified to drive forces through major leg bones and muscles to realize medical benefits and present to NASA exercise scientists for evaluation. Very light weight, compact exercise devices are considered a necessity for long duration space flight missions. Existing ISS countermeasures are not only functional limited, but also bulky, complex and require high maintenance. The proposed MR exoskeleton is light weight, compact sized, and capable of providing concentric and eccentric exercises. With the integration of Microsoft XBox Kinnect, the exoskeleton will have full range of flexibility-personalized exercise profile, data tracking, down-linking, and recreation activities: immersive video games and aquatic exercises.

A magneto-Rheological (MR) fluid based exoskeleton leg demonstrator was developed to help long duration exploration mission crews obtain exercise with entertainment during flight and at their destination.

## Anticipated Benefits

MR exoskeleton can be light weight and occupy little space compared with current ISS countermeasures such as TVIS, ARED, CEVIS, etc. Aquatic and other concentric exercises may easily be performed. Actuators may be integrated for eccentric exercises.


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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Johnson Space Center (JSC)

**Responsible Program:**

Center Innovation Fund: JSC CIF

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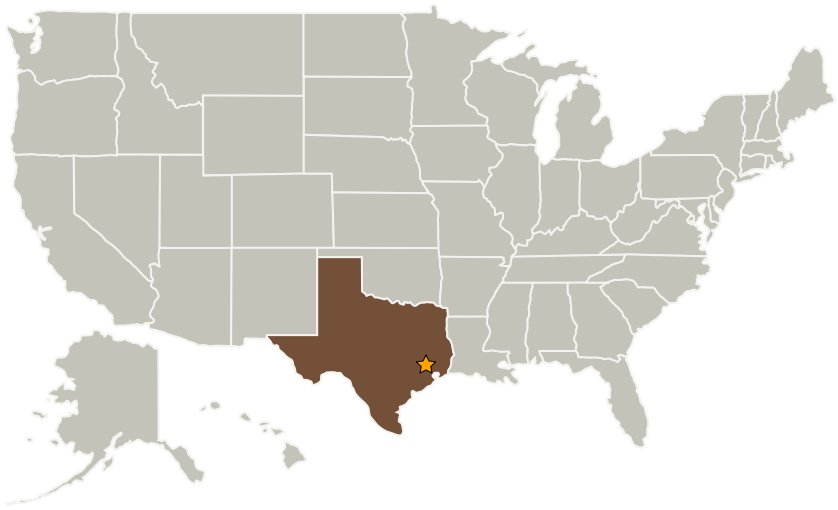
## Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Johnson Space Center(JSC) | Lead Organization | NASA Center | Houston, Texas |
| Jacobs Engineering Group, Inc. | Supporting Organization | Industry | Dallas, Texas |

| Primary U.S. Work Locations |
|---|
| Texas |

## Project Management

**Program Director:**
Michael R Lapointe

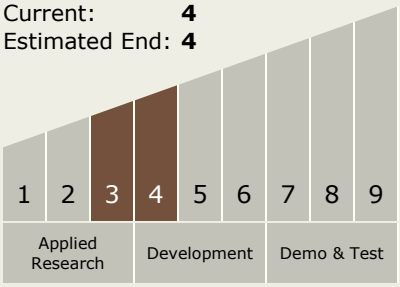
**Program Manager:**
Carlos H Westhelle

**Project Manager:**
Satish C Reddy

**Principal Investigator:**
Satish C Reddy

## Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**




## Technology Areas

**Primary:**

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.6 Long Duration Health